

## **Cyanate Ester and Phthalonitrile Impregnated Carbon Ablative TPS**

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### **ABSTRACT**

Phenolic resin has extensive heritage as a TPS material, however, alternative resin systems such as Cyanate Ester and Phthalonitrile may offer improved performance compared to state-of-the-art phenolic resin. These alternative resin systems may have higher char yield, higher char strength, lower thermal conductivity and improved mechanical properties. In current work at NASA Ames alternative resin systems were uniformly infused into fibrous substrates and preliminary properties characterized. The density of the cyanate ester infused in fibrous substrate ranged from 0.25-0.3g/cm<sup>3</sup> compared to PICA (Phenolic resin impregnated carbon ablative) having a density of ~ 0.25g/cm<sup>3</sup>. The density of Phthalonitrile varies from 0.22-0.25g/cm<sup>3</sup>. Initial formulations of these new resin systems were recently tested at the LARC HyMETs facility to evaluate their performance and data such as back face temperature, char yield, and recession are compared to PICA. Cyanate Ester and Phthalonitrile impregnated carbon ablative samples showed comparable performance to phenolic resin impregnated carbon ablative samples.